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February 20, 2018

Reply to Comments

RESPONSE EFFORTS UNDERTAKEN DURING 2017 HURRICANE SEASON

PS Docket No. 17-344; WT Docket 16-239 NPRM; RM-11708; RM-11306

Dear Federal Communications Commission:

I am writing in reply to comments made by the American Radio Relay League (ARRL) and Steve Waterman in PS Docket No. 17-344. In their comments, they try to submit comments on other rulemaking proceedings, namely Docket WT 16-239 NPRM and RM-11708, which seems entirely inappropriate. Moreover, their comments in that regard and in other ways are substantively misleading and detrimental to the amateur radio service. Their advocacy of the usage of Pactor 4 and their urging for immediate approval of Docket WT16-239 NPRM (or adoption of RM-11708) ignore substantial and legitimate harmful interference concerns which they have admitted in public forums, ignore current and important violations of Part 97 rules associated with today's wideband data usage on the HF amateur radio bands, and introduce serious national security risks associated with Docket WT 16-239 NPRM and RM-11708.

1. My experience as a wireless communications researcher and experience before the Federal Communications Commission (Commission or FCC) is extensive. I am the David Lee/Ernst Weber chaired professor of electrical and computer engineering at New York University's Tandon School of Engineering, as well as a professor in NYU's Courant computer science department and the NYU School of Medicine. I have founded three internationally acclaimed wireless research centers (at Virginia Tech, University of Texas at Austin, and NYU), and have written many textbooks that are used throughout the world to teach communications engineering. Over the past many years, my research has proved to the world that millimeter waves may be used for mobile wireless applications. I have served and shall willingly continue to serve the FCC in matters for the public good. For example, I am a past member of the FCC's Technological Advisory Committee (TAC), having served from 2004-2007, and have provided technical advice to the FCC over my career as an electrical engineering professor and wireless communications researcher. More recently, I testified at FCC Hearings in the aftermath of Hurricane Sandy at the Brooklyn Law School on February 6, 2013, and gave the opening keynote address at the Commission's Spectrum Frontiers Workshop on March 10, 2016. On September 23, 2016, I gave an ex parte presentation to FCC officials on the subject of Docket WT 16-239 NPRM (links to my ex parte presentation and associated public filings appear below my signature). I am an extra class amateur radio operator, N9NB, and have been licensed since 1975. I am a life member of the ARRL, a member of the CW Operators Club, and am an active amateur radio operator, with a focus of narrowband morse code (CW) communications. I remain at the Commission's service, and am willing to meet with public safety, homeland security, and wireless telecommunications bureau officials at the FCC regarding the topic of this reply. I have tried earnestly over the past several years to have a constructive dialogue with ARRL on the subject of RM-11708 and its digital data ambitions for amateur radio, and with the exception of a constructive conversation with ARRL Director Dick Norton, N6AA, at the Dayton Hamvention in May 2014, the ARRL has continually ignored my invitation to discuss the issues. Numerous important technical facts and consequences have been ignored by Steve Waterman and ARRL in this and past proceedings.
2. With regard to PS 17-344, I commend the Commission for seeking solutions to improve and assist emergency preparedness in Puerto Rico and the USA. I am sorry that the Commission is forced to deal with the pettiness of certain special interests in amateur radio, and the lack of national

leadership in the amateur radio hobby, especially in the face of much more important issues surrounding human health and public welfare in the wake of the Puerto Rico disasters. Unfortunately, the proceeding is cluttered with pleadings from amateur operators and many non-amateur operators who desire free HF internet and encrypted email service using the limited amateur radio spectrum. Many who are urging the FCC to modify its Part 97 rules, 97.307(f), to remove the existing 300 baud limit so as to permit Pactor 4 and other wideband digital modulations, are simply interested in free HF internet and email, and other encrypted forms of machine-to-machine communications, and are filing in this proceeding under the guise of “improved emergency communications.” The Commission must consider the technical realities of harmful interference, and must **not** remove the 300 baud limit in the HF amateur radio bands without first replacing it with a narrowband emission limit of 200 Hz to 500 Hz for a large portion of the HF RTTY/DATA subbands, to ensure amateur radio narrowband communications may continue to exist. Below, I note how the ARRL and Mr. Waterman have publicly admitted all of these facts to the Commission in the past, but have chosen to ignore them over the past few years as they have tried to push their wideband digital agenda through RM-11708 and Docket WT16-239 NPRM, and now in this proceeding dealing with emergency preparedness.

3. Amateur radio is a vital national resource, as it promotes international goodwill and provides a community of technical experts who are able to hone critical technical and communication skills. Amateur operators also provide emergency communications, and often take part in emergency preparedness drills, usually on the less crowded very high frequency (VHF) and ultra-high frequency (UHF) bands that offer reliable communications within a 1 to 30 mile range, and where larger spectrum allocations already permit for wideband data transmissions. On rare occasions, emergency communications on HF frequencies are also effective, allowing for long distance communication, usually by voice (single sideband- SSB) or morse code (CW), radio teletype (RTTY), or with narrowband data modes such as FT-8 or PSK31. In the pioneering spirit of amateur radio, whose participants are skilled at exploiting very small spectrum allocations, amateur operators have recently developed and popularized sophisticated ultra-narrowband data emissions (using much less than 100 Hz emitted RF bandwidth), such as FT-8 and WSPR-X.
4. There are about 750,000 US amateur radio licensees, second only to Japan in number. The amount of spectrum allocated to the amateur radio service is extremely small, especially in the medium frequency (MF) and high frequency (HF) band segments between 1.8 MHz and 30 MHz that enable global transmissions via the ionosphere. In fact, there are 10 tiny high frequency (HF) spectrum bands that the FCC has allocated for sharing by all 750,000 US amateurs, and which are also used by approximately 2.3 million more amateurs outside of the US (the 160 m, 80 m, 60 m, 40 m, 30 m, 20 m, 17 m, 15 m 12 m, and 10 m bands). These small slivers of HF spectrum are governed by international and **generally applicable standards and agreements** provided by the International Amateur Radio Union (IARU) and by individual countries that ensure open, hobby (non-commercial) use, using operational modes within subbands in each HF band allocation (e.g. where narrowband morse code (CW) and other narrowband data such as FT-8, PSK31, or RTTY signals with less than 200 to 500 Hz bandwidth are assigned to the lower portion of each HF band, and wider bandwidth image or voice signals (SSB) with 2.8 kHz bandwidth are assigned to operate in the higher portion of each HF band, such that they do not interfere with each other given their disparate emission bandwidths).
5. Unlike commercial, maritime, military, and government HF networks, amateur radio communications must provide open, freely monitored communications, and amateur radio (“ham”) operators generally use conversational, human-generated (by hand) or keyboard-generated data. Amateur radio operators do not use “assigned channels”, but must continually tune their radios throughout the allocated spectrum and must share the spectrum with other human operators across the world using real-time “gentleman’s agreements” to ensure

communications do not interfere with each other. That is, the amateur radio service is for “hobby use” conversational communications without the use of dedicated channels, unlike commercial maritime networks, or government and military networks that use automated servers or machine-to-machine communication and discretely channelized spectrum assignments to carry internet or email traffic. Throughout the history of the amateur radio service, it has been widely understood that narrowband amateur communication modes in this “unchannelized” spectrum are highly susceptible to interference from wider bandwidth communication modes, and that narrowband communications must be protected from wideband transmissions in order to exist. The generally accepted practices of all three IARU regions make this clear, where wideband Pactor 3/Pactor 4 data and voice (SSB) signals are forbidden from operating in the narrowband subbands that house CW/RTTY and other narrowband data. My ex parte presentation to the Commission in Docket WT16-239 NPRM illustrated this point.

6. Both ARRL and Steve Waterman have acknowledged the above stated technical facts in the past, very clearly and in the public record, in comments they filed in RM-11306, but they have deliberately ignored these same vital technical facts in RM-11708, Docket WT 16-239 NPRM, and in the current proceeding.
7. Mr. Waterman, on January 30, 2006, expressly stated to the FCC in the RM-11306 proceeding that the approach taken by RM-11708 and Docket WT 16-239 NPRM have “no business” allowing existing narrowband operations and wider bandwidth Pactor 4 in the same spectrum allocation:
<https://ecfsapi.fcc.gov/file/6518324273.pdf>

“Put another way, wider band analog or digital modes, and especially, high speed, 100 percent error free wideband data transfer protocols under local and remote control have no business in the same space with the narrow band “conversational,” real-time typing speed modes, and experience is showing that combining such operations of different bandwidths just causes conflict regardless of the nature of the protocols involved.”

Mr. Waterman, in RM-11306, admits the very point that the broad community has made to the FCC, through the vast number of replies that call for the rejection of Docket WT16-239 NPRM and RM-11708. He specifically admits that existing narrowband transmissions can only coexist with other narrowband transmissions, and not with the wider bandwidth emissions like Pactor 3 or Pactor 4, or voice/image transmissions:

“....the fact that they are of relatively equivalent bandwidth plays an important role in their ability to coexist.”

8. ARRL, in its original RM-11306 filing in 2005, admitted the technical reality that higher speed (wider bandwidth) digital data needs to be allowed **only if it does not create interference** with current narrowband data modes in regular use: <http://www.nu9n.com/images/RM-11306.pdf>

“In summary, there is a need to permit higher speed digital data communications in the bands between 1.8 and 450 MHz, but to do so in a manner that does not create interference with current analog or other digital modes in regular use in these crowded allocations.”

9. The ARRL, in its RM-11306 filing, specifically mentioned Steve Waterman and the Pactor 3 signaling scheme when it asked the Commission to allow for the use of Pactor 3 modulation in the voice/image (phone) subbands of the HF amateur bands, and admitted the need to protect narrow band transmissions (CW/RTTY/narrowband data) and to ensure all wideband digital communication was documented and open to interception over the air:

“Having a narrow bandwidth segment and a wide bandwidth segment in a given allocation would tend to keep signals of roughly the same bandwidth in their own spectrum. The specific bandwidth limits, once incorporated in the Rules, would allow a more natural development of new digital technologies. It would also satisfactorily protect incumbent analog services to a reasonable extent...”

“The HF allocations offer the least opportunity for frequency re-use, and the higher UHF and microwave bands offer the most flexibility in this respect....”

“...and to require that digital data protocols be published, so that they can be duplicated and monitored to protect against intruders.”

10. The ARRL withdrew RM-11306 in 2007 over backlash from its membership and the broad amateur radio community, which was against the Pactor and Winlink concepts that would use the amateur radio frequencies for encrypted email and internet usage. Numerous commenters in RM-11306 cited the fact that Pactor 2, Pactor 3 (and now Pactor 4) protocols use an undocumented and proprietary/unpublished compression scheme which creates intentionally obscured messages that are not able to be intercepted by other amateur operators or Official Observers, thus in violation of Part 97 rules (in particular, the compression mechanisms are not open or documented in violation of 97.309(a), and communications using Pactor 2, 3, and 4 are obscured, in violation of 97.113). In 2013, ARRL retooled RM-11306, this time attempting to insert Mr. Waterman’s wideband Pactor 4 Winlink data with undocumented compression (e.g. encryption) in the RTTY/Data/CW HF subbands through RM 11-708. Tellingly, in its RM-11708 filings to the Commission, the ARRL and Steve Waterman, and other Winlink/Pactor 4 advocates, made no mention whatsoever of existing rule violations of 97.309(a) or 97.113, and never mentioned the harmful interference the proposal would create for incumbent narrowband modes, thus ignoring their own testimony and technical facts they had admitted to the Commission in RM-11306.
11. In RM-11708, the ARRL asked the FCC to remove the 300 baud symbol rate limit on HF transmissions (with the same intent as RM-11306, except now targeting the RTTY/data/CW subbands of the HF amateur spectrum, instead of the phone/image subbands addressed in RM-11306), and once again there was wide dissent by the US amateur radio community after it was “discovered” on the FCC website by the broad amateur community. Comments filed in RM-11708 after March 15, 2014 show more than 90% of the more than 800 commenters were strongly against RM-11708.
12. Unfortunately, the FCC seemed to ignore comments filed by amateur operators in RM 11-708 after March 2014, and regrettably, the ARRL had represented to the Commission and its own membership that no interference would result through its RM-11708 proposal, when in fact it was quite evident that such a proposal would create harmful interference (the ARRL later admitted this fact in its comment to the Commission for Docket WT16-239 NPRM, where ARRL stated that amateurs opposing RM-11708 and Docket WT 16-239 NPRM have legitimate concerns that need to first be addressed by the Commission before it could consider enacting Docket WT 16-239 NPRM:

“Notwithstanding any of the foregoing, those who either opposed deletion of the symbol rate limit or supported that deletion but opposed the ARRL’s proposed 2.8 kilohertz maximum bandwidth for locally and remotely controlled data emissions in the MF and HF bands *have a very valid concern that absolutely must be addressed.*”

<https://www.fcc.gov/ecfs/filing/1011120327463> (also see Footnote 13 in ARRL's comment). The general US amateur radio population, and ARRL membership, was never consulted or given any due process by the ARRL while it crafted RM-11708, and ARRL ignored outcries regarding the consequence of interference and existing FCC violations of wideband data users once the US amateur community discovered what the ARRL had done in RM-11708 (which was basically a retool of RM-11306, but now with aggression toward the narrowband data/RTTY/CW segment of the hobby). The FCC then proposed something *even more damaging to the amateur radio service* than RM-11708, when it released Docket WT 16-239 NPRM.

13. Without citing many of the technical problems, current rules violations, and major harmful interference concerns that were noted by hundreds of public commenters in RM-11708 (and which were never represented to the FCC by ARRL and Mr. Waterman in that proceeding), the FCC issued Docket WT 16-239 NPRM 16-96 on July 28, 2016. There was overwhelming displeasure and a wide outcry over the Commission's Docket WT 16-239 NPRM, as can be seen at public comments filed in Summer 2016, where many commenters stated the precise technical arguments about interference, the numerous FCC rules violations by ACDS transmissions, the improper use of amateur radio conducted over email and internet, and the need for documented coding (e.g. avoidance of encryption through the use of open and published compression algorithms). These problems were all admitted by ARRL and Mr. Waterman in RM-11306, but were never stated by either of these parties in RM-11708 or Docket WT 16-239 NPRM. The undersigned personally visited FCC officials in an ex parte meeting to discuss these issues on September 23, 2016. Over 90% of public commenters opposed Docket WT 16-239 NPRM, including ARRL. See comments at: https://www.fcc.gov/ecfs/search/filings?proceedings_name=16-239&q=16%5C-239&sort=date_disseminated,DESC
14. The Commission should note that the ARRL represents only about 20% of the licensed US amateur operators, so it cannot claim to be the national political voice for the hobby. In recent years, the broad US amateur radio community has become increasingly weary of the leadership and governance at ARRL (see, for example, <http://MyARRLVoice.org>). In RM-11306 and RM-11708, ARRL and Mr. Waterman have continually taken a position of advocacy for machine-to-machine and automated (and encrypted) HF data communications for email and internet usage, even though this represents the interests of a very small minority (perhaps only a few thousand out of 750,000) US amateur radio operators. Current amateur radio activity by some of these data advocates that run Winlink email servers result in daily violations of Part 97 rules that are not being enforced, and this problem has never been addressed by ARRL or Mr. Waterman. This has caused some to speculate that there is a hidden agenda based on monetary interests, or some other secret motivation for the ARRL, Steve Waterman, and Winlink-associated groups to continue their pursuits for wideband digital access in the very limited amateur radio HF spectrum, when much greater bandwidths and more suitable spectrum for such experimentation and usage exists in the VHF and UHF amateur allocations. The Commission should consider the possibility of a hidden agenda behind the positions of ARRL and Steve Waterman. It is worth noting that the famous computer entrepreneur Vic Poor, W5SMM, was a driving force for digital data in HF bands, was a founding member of Winlink, and was a leader in ARRL's original RM-11306 ad-hoc drafting committee. The ARRL presented Mr. Poor with its President's Award, the highest recognition given by ARRL to a member, just a few months prior to Mr. Poor's death in 2012, causing some to conjecture that the continual and relentless digital data pursuits in the HF spectrum by ARRL and Mr. Waterman might be motivated by a contingent bequeath from Mr. Poor's estate, or perhaps there is some monetary connection between ARRL, Winlink and/or SCS, the sole vendor of the proprietary Pactor signaling scheme. While this is speculation, it is interesting that ARRL's own press release, made about a year before ARRL filed RM-11708, specifically mentioned Mr. Waterman just as they did in their FCC filing for RM-11306 seven years earlier:

[http://www.arrrl.org/news/vic-poor-w5smm-receives-arrrl-president-s-award](http://www.arrl.org/news/vic-poor-w5smm-receives-arrrl-president-s-award).

The Commission may wish to consider asking ARRL and Mr. Waterman to publicly state any conflicts of interest that might be at work for their continued advocacy for wideband email data in the HF amateur radio service, given that VHF and UHF frequencies are widely available for experimentation and development of wideband communications, have national networks of repeaters, and well suited for emergencies.

15. ARRL and Steve Waterman's positions in this proceeding for the 2017 hurricane season, as in RM-11708 and Docket WT 16-239, ignore their own earlier admissions in RM-11306 of harmful interference that will degrade existing narrowband amateur operators throughout the world. Their comments in this proceeding go against the nature of the amateur radio service as a conversational hobby that strives to use as little bandwidth as possible, to avoid interference with others, and to avoid commercial usage or encrypted data. The Commission should note that positions taken by ARRL and Mr. Waterman were opposed by more than 90% of the nearly 900 thoughtful public comments filed in RM-11708 (on or after March 2014). The Commission should also note that there is resounding public opposition to Docket WT 16-239 NRPM.
16. The ARRL and Steve Waterman have filed comments in PS 17-344, asking the Commission to permanently enact the STA that temporarily removed the 300 baud limit in HF communications during the Puerto Rico disaster (e.g., they seek immediate enactment of RM-11708 or Docket WT 16-239 NRPM to allow Pactor 4 modulations and other wideband signaling in amateur HF CW/data subbands). The requests by ARRL and Mr. Waterman should be denied by the Commission, **as the STA was never used by the amateur hobby during the Puerto Rico disaster, and the NRPM and RM-11708 are harmful to the US amateur radio community, are a threat to national security, are widely opposed to by the US amateur radio population, and would create devastating interference to existing amateur operations that use bandwidths on the order of 200 to 500 Hz (or less)**. The requests by ARRL and Mr. Waterman, if granted, would further perpetuate unenforced Part 97 rule violations that cause out-of-band ACDS emissions and encrypted data and commercial traffic to be transmitted on the amateur service through the undocumented compression algorithms (e.g. Pactor 2 and Pactor 3 today) currently used by some amateur operator bulletin boards. FCC must protect existing amateur radio narrowband communications, as the existing 300 baud limit of Part 97.307 and 97.309(a) has worked to keep a de facto narrowband bandwidth limit that allows the conversational (e.g. human hand-generated or keyboard-generated) narrowband communications by CW, RTTY, FT8, PSK31, etc. to exist. **The FCC should continue to follow its own spectrum management practice, even advocated by ARRL and Mr. Waterman in RM-11306, and must continue to ensure that narrowband transmissions are protected such that they co-exist in spectrum that contains other modes only of comparable narrow bandwidths. Docket WT 16-239 NRPM and RM-11708 violate this basic technical requirement.** Furthermore, the FCC must realize that current wideband Pactor and Winlink transmissions are encrypted, as they obscure the transmitted signal so others cannot intercept the message and many are using the ham bands for pecuniary interest through business email and bypass of commercial services. The FCC must clarify Part 97.307 and 97.309(a) rules so that all transmissions are publicly documented with open compression algorithms that can ensure eavesdropping of all modems in automated-request (ARQ) mode. Currently, some amateur traffic is obscured, thus encrypted, on the amateur bands when Pactor 2 and Pactor 3 is used in ARQ mode such that others cannot eavesdrop, since the compression algorithms used in Pactor 2, Pactor 3 and Pactor 4 are secret and are not known or given publicly. If the FCC insists on removing the 300 baud rate limit on HF, they must replace the 300 baud rate limit with a narrow band emission bandwidth limit of 200 to 500 Hz for most of the CW/Data subbands, in order to ensure human-generated narrowband communications may continue to exist.

17. In this proceeding, the Commission should take the ARRL's lengthy commentary about its role in emergency communications in Puerto Rico with a huge grain of salt. The public record shows that there were no emergency communications conducted by amateur radio operators using the temporary authorized Pactor 4 emissions (under the STA), despite the ARRL's deliberate attempt to "insert" emergency operators ("Force of 50") into the emergency scene. The public comments by Mr. Moloney, who served admirably as an amateur radio volunteer in Puerto Rico, make clear that no Pactor modems were available, and that **Pactor 4 was never used in the Puerto Rico emergency**. He also mentions VHF as being very useful frequency for emergency communications, a theme that was mentioned by many others who were on the ground in Puerto Rico.
<https://www.fcc.gov/ecfs/filing/1012254347531> (at 7).

18. Other on-the-ground accounts of amateur operators in Puerto Rico also show that the ARRL sent 22, not 50, hams to Puerto Rico, and that the ARRL had clear intent to generate publicity for the hobby, with intent to urge the Commission for permanent adoption of the STA to allow Pactor 4 modulations over HF, despite the fact it was never used at all. On-the-ground reports by actual amateur operators who selflessly dedicated themselves to helping the public show that the ARRL's request to obtain publicity actually created dangerous situations, and were not cooperative with the needs of the Red Cross, sometimes actually hindering the emergency operations where it was found that ARRL leaders used the emergency to grandstand and promote their agenda. This is a very unfortunate example of "not letting a good crisis go to waste," and shows the depth of aggression of the ARRL and Mr. Waterman as they try to persuade the FCC to legalize wideband data on the tiny slivers of HF spectrum that are currently used globally by narrow band operations. Interviews on the popular web magazine *Ham Radio Now* with amateur radio operators NS0S and N5TGL (two of the 22 ARRL deployed operators for the Puerto Rico emergency) reveal problems and grandstanding efforts by ARRL:
<https://www.youtube.com/watch?v=ID4uK8AKq4w> (See 14:00 to 16:00 and 1:36:00 to 1:45:00, for example). Many postings on the Reddit website from on-the-ground amateur operators in Puerto Rico, and those close to the situation, further confirm the fact that ARRL was "looking for headlines" to promote its presence and data ambitions, with a likely eye towards pushing for permanent adoption of the STA that temporarily removed the the 300 baud limit of Part 97.307 and 97.309(a), even though the STA and Pactor 4 were never used. See, for example:
https://www.reddit.com/r/amateurradio/comments/772zlk/please_cancel_your_arll_membership/

A sample of the dialogue of the above Reddit web link is reproduced here:

[NS7I] Do you feel like the ARRL sent people to Puerto Rico more so as a means to promote ham radio than to actually help people?

[NS0S] Yes, very very much so. They stressed everyday how they wanted photos. We had no internet but they wanted us to make sure we got them photos.

[EM15 & OJ11] For the past couple of weeks, the way the situation was covered by ARRL (via news aggregation sites) did seem to me like they were milking it quite a bit, imo ... just way more 'news release' than I was comfortable with.

19. These public comments, interviews, and first-hand accounts show that the Winlink computer system was primarily used with telnet/cellphone internet (e.g. commercial cellular internet connections over Puerto Rico cellphone providers such as Verizon), and were not often used with

HF radios, and certainly **never used with Pactor 4**. Many of these accounts are emphatic about the importance of VHF and voice communications. While Winlink with Winmoor 1600 was shown to have some valid utility during the emergency, the use of voice was much preferred, and wideband HF data usage was minimal in serving the public good. Thus, Pactor 4 and Winlink appear to be no better than other modes of amateur radio communications over HF in an emergency, and data over the cellular telephone network and VHF modes were most useful in the emergency in Puerto Rico. **These numerous first-hand accounts show that the STA (that removed the 300 baud limit for amateur HF data) was not used at all by amateur radio operations in Puerto Rico, despite the request and comments filed by ARRL and Steve Waterman in this proceeding.**

20. The Commission should note the numerous brief express comments that were filed after the comment period in this proceeding in support of Steve Waterman's position. The Commission should note how similar these comments are to those filed in favor of RM-11708 during the first few weeks of the RM 11-708 proceeding in November/December 2013. It is clear that there is a very small minority of citizens, many who are not even licensed amateur radio operators, who desire wideband encrypted data on the amateur HF bands. Just as has been done in this current proceeding, this vocal minority flooded the FCC public comment system with "cut and paste" comments early in RM-11708. Mr. Waterman has been a leading figure in Winlink, a commercial internet technology that, while claimed recently to be useful for emergency communications, is actually most popular for marine internet email over shortwave, used on HF marine networks, as discussed in this New York Times article which reveals ambitions of Mr. Poor and Mr. Waterman:

<http://www.nytimes.com/2001/11/22/technology/radio-e-mail-connects-ships-to-shore.html>

The Commission should consider that In the early days of the RM 11-708 proceeding, the commercial maritime internet service website, Sailnet (which advocates the commercial use of Winlink and SCS modems for boaters who are not necessarily amateur radio operators) was very active in urging private boat owners (not necessarily amateur operators, but rather US citizens with a desire for boat email) to comment for the adoption of RM 11-708. This can be seen at:

<http://www.sailnet.com/forums/general-discussion-sailing-related/111746-us-citizens-urged-support-fcc-rm-11708-a.html#/topics/111746>

21. Winlink, itself, is a system able to provide boaters with internet service when connected to Pactor 3 and Pactor 4 modems using HF networks, and it also connects with cellphones or wired internet connections. SCS is a European company that maintains the proprietary and undocumented compression algorithms used in its PACTOR modems that are sold for maritime and remote internet usage over HF. It makes perfect sense that the amateur radio spectrum would be an attractive source of raw bandwidth for commercial or private email and internet services desired by citizens, especially those who do not want to pay for commercial service and who instead want to use the free amateur radio bands for HF email and internet access. It also makes sense that anyone with a pecuniary interest in SCS would be eager to see Pactor 4 allowed in the amateur radio band, to open up a new market for modem sales. See these links for clarification of Winlink and SCS, and what some advocates of Docket WT 16-239 NPRM wish for the amateur radio service to become. A vast majority of commenters in RM-11708 (especially after March 15, 2014) and the vast majority of commenters in Docket WT16-239 are emphatic that this vision for the amateur radio service is in *direct conflict* with FCC Part 97 regulations for the amateur radio service, and not what the amateur radio service was created for:

<https://ecfsapi.fcc.gov/file/7521315143.pdf>

<https://winlink.org/>

<http://www.scs-ptc.com/en/Home.html>

22. The Commission and others should wonder why the ARRL and Mr. Waterman have abandoned the technical realities of interference that is sure to be caused to narrowband signals in RM-11708, and why they now ignore the problems with ACDS operation and the problem with encrypted data, after acknowledging these key facts in their public comments in RM-11306. I submit that this may suggest that advocates for wideband data in the amateur radio service HF spectrum may not be forthright in stating they merely seek experimentation or emergency communication or updated rules, but in fact they may simply be seeking additional bandwidth for which to carry maritime communications or internet/email traffic, or they may be seeking to open a new market for sales of its wideband modems into the USA, or perhaps they are motivated by a revenue share arrangement from SCS or a contingent bequeath from Vic Poor's estate. In any case, it should be clear to the Commission that Mr. Waterman and ARRL represent a very small minority of citizens who wish to turn the amateur radio service into something more akin to an "Internet Citizens Band", with access to the amateur radio HF spectrum for wideband email traffic that is both encrypted (through undocumented and proprietary compression methods used in Pactor 2, Pactor 3 and Pactor 4 when in ARQ modes) and which are wideband in nature – as wide or wider than SSB signals (2.8 kHz), and orders of magnitude wider than existing narrowband HF transmissions. The Commission must note its major flaw of an unspecified bandwidth for Docket WT 16-239 NPRM, since such SSB signals themselves have never been allowed to operate in the same subband of conventional DATA/RTTY/CW because of the huge interference the SSB signals would cause – so why would the Commission now propose to allow data signals with emissions as wide or wider than SSB signals to coexist with the narrowband data modes? It makes no sense, technically. Furthermore, why would the Commission propose to remove the bandwidth emission limit for data in the most limited and scarcest amateur radio bands (HF), yet retain the baud rate regulation for the much wider VHF and UHF bands that can more readily support wideband data because of the much greater spectrum allocation? The Commission must institute a 200-500 Hz bandwidth emission limit in the majority of every HF DATA/RTTY/CW subband to ensure narrowband operations may continue to exist in the scarce HF allocations.
23. While the original Pactor modulation and compression methods advocated by Vic Poor and ARRL in the 1970s and 1980s for ACDS (Pactor 1) were publicly documented so that anyone could build a decoder to intercept transmissions, later versions of Pactor, including the compression algorithms, were commercialized by SCS and those used in more modern Pactor modes are not publicly documented and are kept private. Specifically, Pactor 2, Pactor 3 and Pactor 4 use proprietary, undocumented compression algorithms having to do with unique keyboard key presses and instantaneous channel conditions known only between the transmitter and receiver in automated-request-mode (ARQ), such that anyone attempting to eavesdrop the modern Pactor transmissions cannot decipher the communication over the air. In essence, this is an encryption method that makes Pactor transmissions secure, greedy (in terms of creating interference and running over narrowband transmissions), and not suitable for amateur radio hobby use, yet very effective for maritime or commercial internet use. Please see: <http://www.scs-ptc.com/en/PACTOR-4.html> and <http://www.scs-ptc.com/en/Home.html> for more information on the commercial applications of Pactor and how it can specifically run over narrowband transmissions. The use of modern Pactor, (e.g. Pactor 2, 3, and 4) is directly counter to FCC regulations and past ARRL admissions that the hobby needs to be self-policing with open communications. Mr. Waterman and ARRL have continually ignored these critical facts in their positions.
24. Mr. Waterman and others in this proceeding have urged the Commission to allow encrypted data in the amateur radio bands, especially during emergencies, so as to comply with HIPPA regulations. This reasoning appears to be an attempt to legitimize the numerous existing daily violations cited in the public record by Winlink/ Pactor users on the amateur radio bands who are using encrypted transmissions through Pactor. As noted in Dan White's reply to comments, Dr. Scott Wright, KOMD, a leading cardiac physician at the Mayo Clinic, is clear that HIPPA concerns

are not appropriate for amateur radio. More importantly, the Commission gave its Order on RM-11699 in 2013, expressly denying the use of encrypted transmissions in the amateur radio service, even in the case of emergencies or drills. Open communication is a fundamental tenant of the amateur radio service, yet this is another position that Mr. Waterman, ARRL, and other Winlink/Pactor advocates for HF internet attempt to chip away at in their quest to encrypt the amateur radio hobby, perhaps hoping for additional spectrum allocations for their HF internet/email ambitions. The Commission should note that beyond Pactor, the use of web browsing with https:// links offers instant and prohibited email encryption over amateur radio links. The need to ensure that there is no encryption or secure or obscured communications of any kind in the amateur radio hobby is a position that both the FCC and ARRL have clearly agreed upon in RM-11699, so it is very disconcerting to see the ARRL advocating for Pactor 4 and other wideband digital modes in RM-11708 and Docket WT16-239, without admitting or addressing the well-known problem of encrypted data with existing Pactor 2 and Pactor 3 (and Pactor 4) transmissions, and when there are known daily infractions of encrypted data and an inability to decipher today's amateur wideband data that is using private/undocumented ARQ compression.

25. In the wake of the Puerto Rico disaster, nothing has changed, factually, since my ex parte presentation at the Commission on September 23, 2016, except for further evidence offered in this proceeding that ARRL and Steve Waterman, and their minority following, do not speak for the wide community of amateur radio operators in the US, and that this minority will clearly go to excessive lengths to promote their agenda to legalize encrypted wideband internet and email data that can operate anywhere in the amateur radio HF data spectrum, while creating harmful interference to existing narrow band amateur operators. The FCC should note the continual widespread public rejection of Mr. Waterman's and ARRL's positions on RM-11306, RM-11708, Docket WT 16-239, and now in this proceeding. The proponents of wideband data in the amateur band continually fail to acknowledge the technical truths and public opinions that were vocalized in RM-11306 and RM-11708, and ignore the myriad existing problems with ACDS and wideband data usage on the ham bands today. Importantly, wideband proponents are missing the fact that they could conduct wideband data experimentation in the much wider spectrum allocations at VHF and UHF frequencies. As far as emergency preparedness is concerned, many commenters who were on the ground in Puerto Rico were adamant about the value of VHF amateur radio spectrum, and the value of the UHF/cellular radio spectrum in emergency situations, yet ARRL and Steve Waterman do not mention this important point—they continue to pound away in hopes of gaining access to the precious and tiny HF spectrum allocations, at the expense of the existing narrowband incumbent operators.
26. The FCC should deny the requests of Mr. Waterman and ARRL for immediate action or adoption of Docket 16-239 NPRM or RM-11708, as their requests are harmful for the well-being of the amateur radio hobby at large, and for proper global use of the scarce HF spectrum, and the recent STA was never utilized. If the existing FCC violations of improper bandwidth usage outside ACDS allocations, improper use of automated data stations that create interference, and the lack of documented compression/encoding by the Pactor/Winlink HF community could be cleared up through improved FCC Part 97 regulations that assure open/documented compression and eavesdropping by other amateur operators, then it would then make sense for the Commission to consider a small allocation, of say 25-30 kHz of bandwidth in each HF amateur band, for wideband HF data traffic. Better yet would be allocations for wideband data in the VHF and UHF amateur bands. The continual all-or-nothing requests for **entire** HF subbands by the ARRL and Mr. Waterman in RM-11306 and RM-11708, and now PS 17-344, without consideration for the interference caused to stateside and global operators, along with the ongoing daily FCC violations of stations using undocumented proprietary compression (e.g. encryption) with Pactor 3 and Winmoor 1600 in unauthorized HF frequencies, should be recognized and cured by the Commission. **The fact that amateur radio never used the STA that temporarily allowed Pactor 4**

in the Puerto Rico emergency must be recognized by the Commission, and should further encourage the Commission to reject the adoption of WT16-239 NPRM, since the ARRL and the amateur radio community did not use the STA even after the FCC offered it up.

27. To summarize, it is widely known throughout the amateur radio hobby, and surely by ARRL and Mr. Waterman, that as stated in my ex parte comments in Docket WT 16-239 NPRM, FCC rules regarding operation in the HF ACDS band segments are continually ignored by many amateur radio stations who use Pactor 3 and Winmoor 1600 (data signals with greater than 500 Hz RF bandwidth). Interference is being created daily by automated and unattended operation of Winlink through Pactor/Winmoor stations outside of the ACDS bands, many stations fail to provide any form of easily detectable identification, and illegal commerce is being conducted on amateur radio frequencies over email and internet. Thus, there continue to be daily violations of FCC § 97.3 (a)(4) “pecuniary interest,” and also § 97.113 (a)(3), 97.113 (a)(4) which “prohibits obscuring the meaning” --in other words, private communication. Mr. Waterman, ARRL, and other wideband HF internet advocates continue to seek allowance of wideband encrypted data in the amateur radio spectrum, incorrectly claiming that the secret “compression” is not “encryption”, and incorrectly claiming amateur operators need to comply with HIPPA, perhaps attempting to legitimize rather than to cure current violations of FCC rules through the present use of undocumented/proprietary compression algorithms of Pactor that create encrypted signals when operated in the efficient ARQ mode. The FCC and ARRL have been clear, and properly so, about the need for amateur radio transmissions to be open and intelligible in all situations so as to ensure the self-policing nature of the hobby (see FCC Order in RM-11699). Doing as ARRL and Mr. Waterman ask in this proceeding would open the flood gates to illegal amateur radio operation, potential use of encrypted amateur radio HF data by terrorists, and would allow wideband digital transmitters to run roughshod over the tens of thousands of US amateur operators who now use narrow band modes such as morse code (CW), RTTY, FT8, PSK31 which all require neighboring signal bandwidths to be on the order of 200 to 500 Hz in emission bandwidth. Removing the 300 baud limit would remove any practical bandwidth limitation on neighboring wideband data signals, wreaking completely havoc on narrowband operations, especially since Pactor stations are specifically promoted as being able to “cut through interference” and overrun narrowband signals as stated at the vendor SCS’s website:

<http://www.scs-ptc.com/en/PACTOR-4.html>

28. In Docket WT16-239 NPRM, the Commission asked if there should be any emission bandwidth standards for HF data communications in amateur radio, and if there are any known generally applicable standards (see NPRM at Para. 12). The Commission should note that all three global IARU HF band maps offer regulation by bandwidth, and provide generally applicable standards that strictly forbid the use of wideband signals, such as SSB and wideband data (such as Pactor 3, Pactor 4, Winmoor 1600, STANAG, etc.) in the narrowband RTTY/Data/CW subband at the lowest portions of each amateur HF band allocation. I pointed this out in ex parte remarks on September 23, 2016 in Docket 16-239 NPRM. The ARRL and Steve Waterman are seeking all-or-none access to **all** of the CW/Data subband spectrum, in such tiny slivers of HF spectrum that are used globally. It would be irresponsible for the FCC to enact Docket 16-239 NPRM or RM-11708 without first cleaning up the myriad problems with station identification, encryption through a private/unpublished ARQ mode, and proper ACDS operation, and only then should a small segment (perhaps a 25 kHz or 30 kHz wide subband located above the existing ACDS bands) be allocated in fairness to all US amateur operators, such that narrowband (e.g. 200 Hz or less transmissions can be assured to coexist only with other modes of 200 Hz or less. The Commission should look at all three IARU bandplans for applicable standards.

Thank you for your consideration of these facts. Please disregard the requests by Mr. Waterman and ARRL in this and related proceedings, and do not enact Docket WT 16-239 NPRM or RM-11708. Mr. Waterman and ARRL do not speak for the wide US amateur radio community, and appear to have a very clear, focused (and perhaps hidden) agenda that they have aggressively pursued for over 13 years since RM-11306, and which they now have unfortunately pursued on the backs of Puerto Rico citizens who have endured great hardship from the recent national disasters. Docket WT 16-239 NPRM and RM-11708 are dangerous for the amateur radio hobby and for US national security and should not be enacted, as they neglect the fundamental need to protect narrowband emissions, to provide open communication, and ignore myriad current problems with existing HF wideband data usage on the amateur radio bands.

Sincerely,

/s/

Theodore S. Rappaport, Ph.D., PE, N9NB

September 23, 2016 Ex Parte PowerPoint™ Presentation and filings for Docket 16-239 NPRM:

https://www.fcc.gov/ecfs/search/filings?limit=25&proceedings_name=16-239&sort=date_disseminated,DESC&submissiontype_description=NOTICE%20OF%20EXPARTE